



## Repair Versus Replacement of Defective Direct Restorations -A Cross-Sectional Study among Dentists in Central India

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### Abstract

**Background:** This study focuses on the preferences of Indian dentists regarding the management of defective composite restorations, specifically examining the choice between repair and replacement.

**Methods:** A cross-sectional survey was conducted using a structured questionnaire administered to active 115 dentists practicing in central India. This survey aimed to collect data on their clinical experiences, viewpoints, and protocols for treating damaged restorations.

**Results:** The findings indicate a diverse range of practices influenced by factors such as patient demographics, material concerns, and the severity of damage. This trend may be attributed to cost considerations, patient preferences, and a growing awareness of the environmental impact of dental materials.

**Conclusion:** The study highlights the challenges dentists face in implementing repair techniques, including a lack of training and material availability. It underscores the need for enhanced educational initiatives and resources to promote evidence-based practices in restorative dentistry.

**Practical Implications:** The findings emphasize the importance of context-specific guidelines that consider both clinical efficacy and patient-centered care, contributing valuable insights to the ongoing discourse on restorative strategies.

**Keywords:** Composite Restorations; Repair Versus Replacement; Dentist Preferences; Restorative Dentistry; India; Cross-Sectional Study

### Introduction

A significant proportion of dental service resources are dedicated to the placement of restorations, all of which have a finite lifespan [1]. Factors influencing the failure of dental restorations include patient and clinician variables, as well as the properties of the restorative material used [2]. The failure of restoration is often attributed to multiple factors, making it challenging to identify the primary cause of this unfavourable outcome [3].

Recurrent caries, marginal defects, discoloration, wear, and loss of anatomic structure are among the most common reasons for restoration failure [4]. However, despite this the most frequently identified cause of restoration failure is the development of recurrent or secondary caries.

Dental clinicians can address failed restorations either conservatively by repairing them, or more radically by replacing the en-

tire restoration [1-3]. Previous studies have shown the influence of dentist and restoration related factors on the treatment decision made by dentists [5]. Around 50% of restorative procedures performed by dentists dedicated to the managing failed dental restoration [6]. The replacement of direct restorations represents approximately 50% through 70% of all dental procedures performed [1-3]. In contrast to replacement technique, which requires complete removal of existing restoration and placement of new one repairing a restoration involves removing the defect and part of original restoration followed by placement of new restoration [4].

Furthermore, replacement of restoration can cause pulp irritation and unnecessary removal of sound tooth structure with higher cost and risk of fractures [3,4]. While replacement of restoration can be less distressing, cost effective, increased longevity and more conservative [4]. The studies conducted previously in different countries have shown that tooth specific (restorative material), patient and dentist were the factors influencing decision to repair versus replacement of restoration [7]. Therefore our objectives were to access the number of dentist choosing repair or replacement of defective composite restoration and relation between the factors determining the decision amongst dentists in central India.

## Materials and Methods

Our study is an observational, cross-sectional survey of a convenience sample of general dental practitioners across central India. An online Google form questionnaire was created. The survey was composed of 18 questions, mostly multiple choice, 1 ranking and 1 fill-in response [19]. This questionnaire was sent to 115 dental practitioners registered under Maharashtra State Dental Council in Central India. Data was confidential and used only for purpose of survey.

Questionnaire aimed at seeking information on general characteristics of respondents, their years of practicing dentistry, whether they were taught the indication for repairing defective dental composite restoration or they were replacing defective restorations. Questionnaire also included questions about the cases of restoration repair, the satisfaction with the repaired restoration one year after procedure had been performed and finally the types of further education that was needed. The sample size for the same was 115. Questionnaire was distributed to dental practitioners who were BDS, MDS, and were doing fellowship. After filling responses questionnaire was returned and results were tabulated in Excel sheet and data was sent to statistician for analysis.

## Results

The study aimed to analyse factors influencing dentists' decisions regarding repair versus replacement of defective dental

restorations. Among the participants, 26.9% were BDS graduates, 64.3% were MDS graduates, and 8.7% were fellows. Professional experience varied, with 39.1% having practiced for 2 years since BDS, 57.3% for 2-15 years, and 3.5% for over 15 years. Key findings revealed that treatment decisions were significantly influenced by restoration conditions. For partial loss of restoration, hard substance loss, or secondary caries, 71.3% opted for replacement, while only 28.7% chose repair ( $p < 0.001$ ). Conversely, in cases of discoloration, marginal discoloration, or marginal gaps, 78.2% preferred repair over replacement ( $p = 0.003$ ). External influences, such as whether a restoration was placed by another practitioner, were not statistically significant ( $p = 0.513$ ), but limited patient finances emerged as a primary factor for repair, cited by 71.3% of participants ( $p = 0.008$ ).

Dentists favoured repair to preserve tooth structure (43.5%) and reduce patient costs (30.5%), with a significant preference for these reasons ( $p = 0.041$ ). Negative personal experiences (60%) and negative dentist feedback (35.6%) were also significant contributors to repair decisions ( $p = 0.024$ ). The most influential factor in repair decisions was defect size, selected by 47% of participants, though this finding was not statistically significant ( $p = 0.092$ ). Regarding replacement, dentists indicated they would replace restorations after one failure (60%) or two failures (31.3%), with statistical significance ( $p = 0.036$ ). Secondary caries (57.4%) and fractured restorations (27%) were the primary motivations for replacement, with significant results ( $p = 0.011$ ). Factors such as secondary caries (64.4%) and restoration fractures (33%) were also significant reasons for forgoing replacement ( $p = 0.012$ ). Amalgam was the most preferred material for replacement (63.5%,  $p < 0.001$ ).

These findings underscore the importance of clinical and patient-related factors in determining whether to repair or replace defective dental restorations, providing insight into decision-making practices in dental care.

This study explored the factors influencing the decision to repair or replace defective composite restorations among dental professionals with varying qualifications. For question 8, a majority of participants across all groups preferred replacement over repair, with 71% of BDS, 72.4% of MDS, and 62.5% of fellowship-trained professionals favouring replacement ( $P = 0.841$ , not significant). In question 9, the preference shifted significantly towards repair among BDS (93.5%), MDS (73.7%), and fellowship (75%) groups, with  $P = 0.049$  indicating a significant difference. Question 10 revealed a consistent preference for replacement across groups, with 73.3% of BDS, 70.1% of MDS, and 66.7% of fellowship participants favouring replacement ( $P = 0.620$ , not significant). Finally, ques-

tion 11 highlighted a stronger inclination towards repair among BDS (88.9%), followed by MDS (73.1%) and fellowship (66.7%), although the differences were not statistically significant (P =

0.114). Overall, the findings underscore variability in decision-making based on professional qualification and situational factors, with significant preferences observed in specific scenarios.

|  | Repair N (%) | Replace N (%) | P value     |
|--|--------------|---------------|-------------|
| What would be your treatment plan if there is partial loss of restoration, loss of hard substance or secondary caries? | 33 (28.7%)   | 82 (71.3%)    | P < 0.001** |
| What would be your treatment plan if there is discoloration, marginal discoloration or marginal gap                    | 90 (78.2%)   | 25 (21.8%)    | P = 0.003*  |

**Table 1:** Factors determining dentists’ decision to repair versus replacement of defective restoration.

P > 0.05-not significant \*p < 0.05-significant \*\*p < 0.001-highly significant.

**Discussion**

The current survey was conducted to study the comparison between repair and replacement of defective direct restorations among dentists in Central India. Our study found that most dentists view repair as an appropriate way to deal with defective restorations rather than opting for replacement. We identified factors related to the repair process and the patient that can influence the dentist’s decision on whether to choose this treatment method.

Dentists may decide against repair due to factors like unsuccessful previous attempts, secondary caries, insignificant experience and type of tooth. Additionally, patient-related factors such as compromised health status, high caries risk were frequently mentioned as reasons affecting the dentist’s choice to repair defective restorations.

The key findings of our study was that most dentists (78.3%) view repair as a viable treatment for defective restorations. However, (21.7%) of them do not practice repair. This does not align with The Dental Practice-Based Research Network’s results, which indicate that dentists in certain areas often replace defective restorations rather than repair them [14,16]. Our study relies on self-reported surveys instead of dental records or restorations analysis, potentially explaining the differences. Moreover, restoration repair has gained more acceptance over the years since previous studies.

In recent years, both US and Canadian dental schools have increasingly taught the repair of defective composite restorations [21,22]. This shift results from evidence-based recommendations highlighting the improved quality of repairs. Consequently, acceptance of restoration repair has grown among dentists and patients

globally [23-35]. The most frequent reason for repairing a defective restoration has been marginal defects. Following this, preservation of tooth structure, limited patient finances, negative personal experience and size defect were also common [19].

Our study showed that most of the dentists i.e. BDS (71%) and MDS (72.4%) prefer to replace the restoration in case of partial loss of restoration and secondary caries. Approximately, BDS (93%) and MDS (74%) prefer to repair the restoration in case of marginal defects. Our study also revealed that BDS (88.9%) and MDS (73.3%) dentists are inclined to opt for repairs when faced with limited patient finances.

Repairing a defective restoration caused by secondary caries is often seen as successful, though it presents clinical challenges. Dentists may hesitate to repair a restoration due to concerns about caries extension and defect size. Size defect is one of the common reasons to forgo restoration repair, aligning with Kanzow and Colleagues Research. (Most selected reason for repairing defective restoration among the dentists who stated that they do not perform repairs in there.

**Conclusion**

The acceptance of repair of defective restoration among general dentist was relatively high (78.3%). However, negative personal experience or lack of success and practice setting affected the dentist decision to repair vs replace a defective restoration. Although minimally invasive treatment approaches such as repair of defective restoration are considered but practice environment in India might me necessary when advocating for this approach. Clinical guidance about repair procedures might be beneficial to avoid lack of success with this procedure.

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